DETERMINING AGE-CLASSES OF TREES IN OLD-GROWTH PONDEROSA PINE / DOUGLAS-FIR FORESTS

Coop Agreement
University
of
Montana

Final Report for Research Joint Venture Agmt
#INT-92662-RJVA with
UNIVERSITY OF MONTANA
FS Contact: Stephen F. Arno
Co-op Contact: Carl Fiedler

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Final Report

Carl Fiedler
School of Forestry, UM

Increased interest in Rocky Mountain old-growth has exposed the limited knowledge base concerning the ecological processes, structural attributes, and historic fire regimes which characterize old-growth stands in various timber types. In particular, ecologists are interested in how old-growth stands are perpetuated and/or replaced. To better understand the processes and attributes that characterize old-growth, annual ring counts and growth data are needed to determine age-class and diameter-class distributions, and thereby provide insights into tree longevity and stand dynamics.

This cooperative study was undertaken to determine the age-classes of trees in six old-growth ponderosa pine/Douglas-fir stands (three each on the Bitterroot and Lolo National Forests). Field sampling was conducted in a 1-ha megaplot in each stand. The increment cores analyzed in this study were collected from all ponderosa pine and a sample of Douglas-fir trees in each megaplot. Only trees established before the era of fire suppression (i.e. circa 1900) were sampled. Cores were analyzed for total age and annual increment using a computer-assisted dendrochronometer.

Results of the tree ring analyses for the three old-growth stands sampled at Sheephead Creek, Bitterroot National Forest, are shown in Figures 1-3, below. In stand 1, all trees living in 1991 were established between 1700 and 1900 (Figure 1). In contrast, establishment of trees in stand 2 (Figure 2) and stand 3 (Figure 3) occurred throughout the period 1500-1900. Figure 4 shows the decadal establishment of trees for the three Sheephead stands combined. Of trees surviving in 1991, ponderosa pine had greater proportional success in establishing during the first part of the 1500-1900 period, whereas Douglas-fir was more successful during the latter part of the period.

Results of the analyses of the three stands sampled at Sawmill Gulch, Lolo National Forest, are shown in Figures 5-7, below. Tree establishment in Sawmill stand 1 (Figure 5) and stand 2 (Figure 6) was fairly well distributed throughout the period from the early 1500's to 1900. In stand 3, establishment of trees still living in 1991 was much more concentrated temporally. The vast majority of trees in this stand were established between 1710 and 1840; no trees were established after 1840, and 95 percent established before 1710.

Figure 8 shows the temporal establishment patterns for the three Sawmill Gulch stands combined. Tree establishment, though varying in amount, was an ongoing process throughout the 1500-1900 time period. The 1520s and 1530s were the only two decades in the 400-year period in which no establishment occurred (Figure 8).

To summarize, tree increment and age data from this study have great potential for use in more detailed follow-up analyses. For example, analysis of tree establishment and increment data in relation to fire events can provide valuable insights into old-growth stand dynamics. With the current high level of interest in global climatic change, these data also have considerable potential for reconstructing climate for periods preceding weather records.

Based on preliminary analysis, the old-growth ponderosa pine/Douglas-fir stands examined in this study are broadly uneven-aged and increasing in proportional composition of Douglas-fir. However, more in-depth analyses are needed to capitalize on the considerable potential of this data set.

Figure 1: Plot 1, Sheephead Cr., Bitterroot N.F.

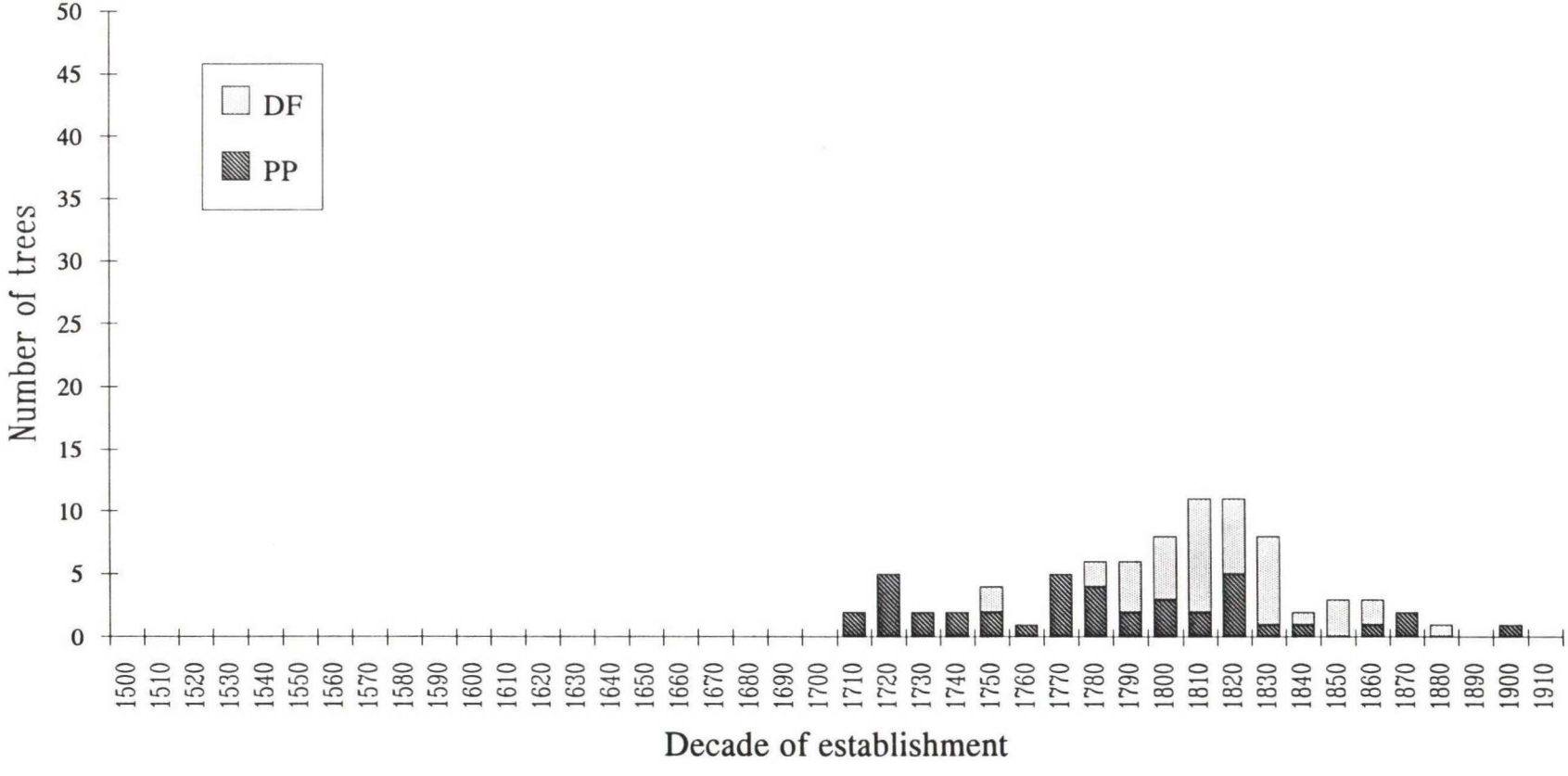

Figure 2: Plot 2, Sheephead Cr., Bitterroot N.F.

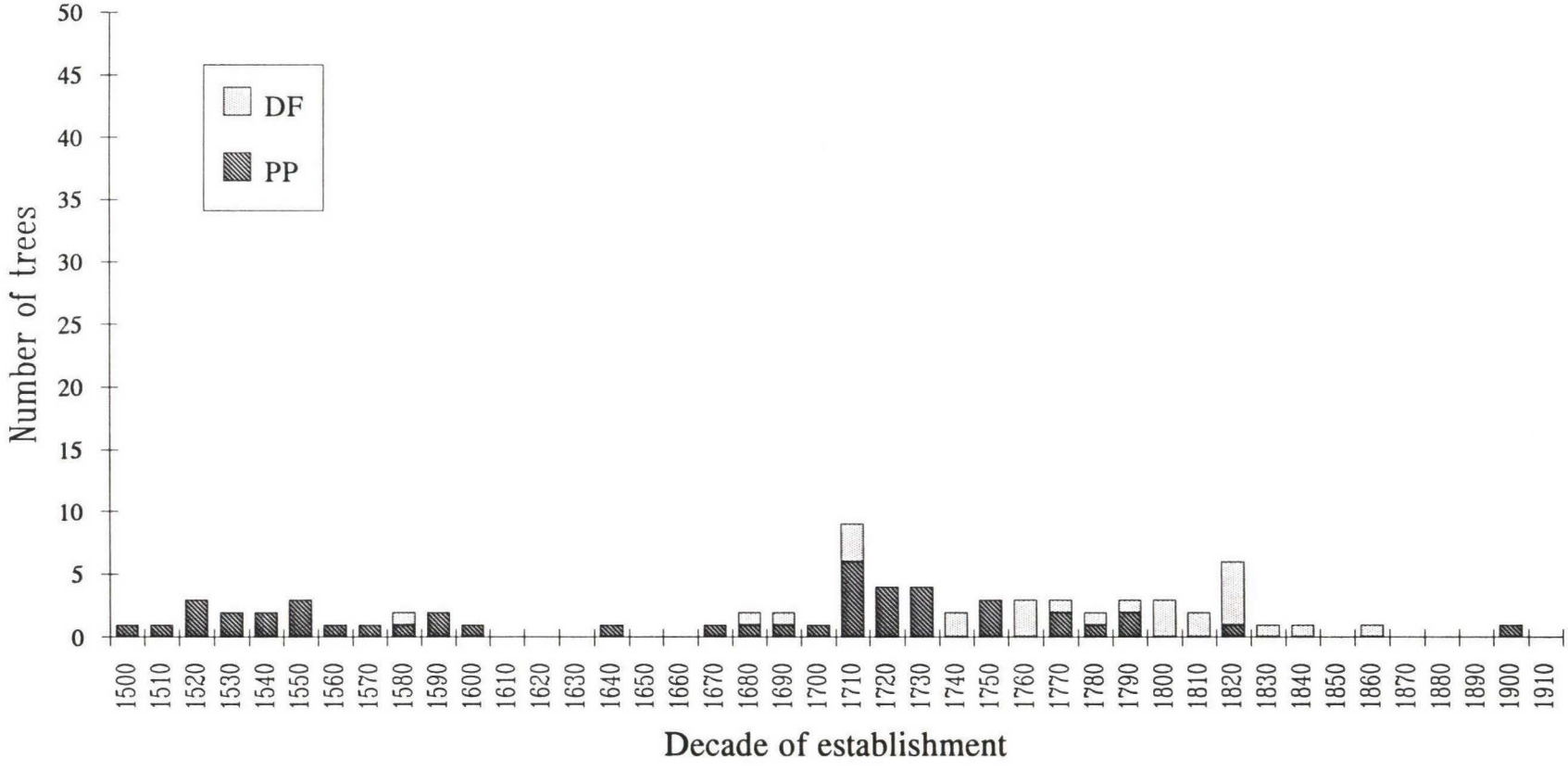

Figure 3: Plot 3, Sheephead Cr., Bitterroot N. F.

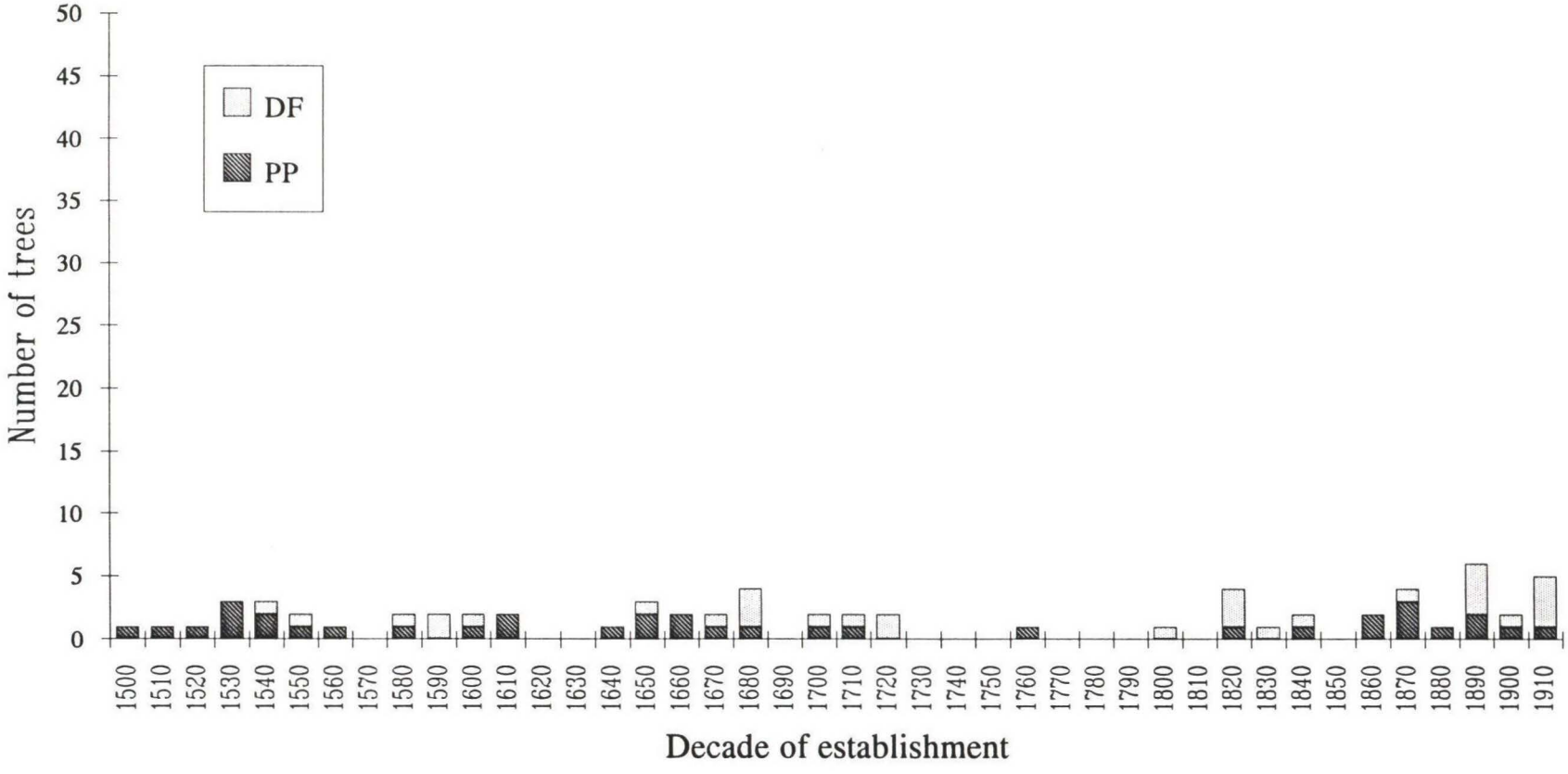

Figure 4: Sheephead Cr., Bitterroot N. F.

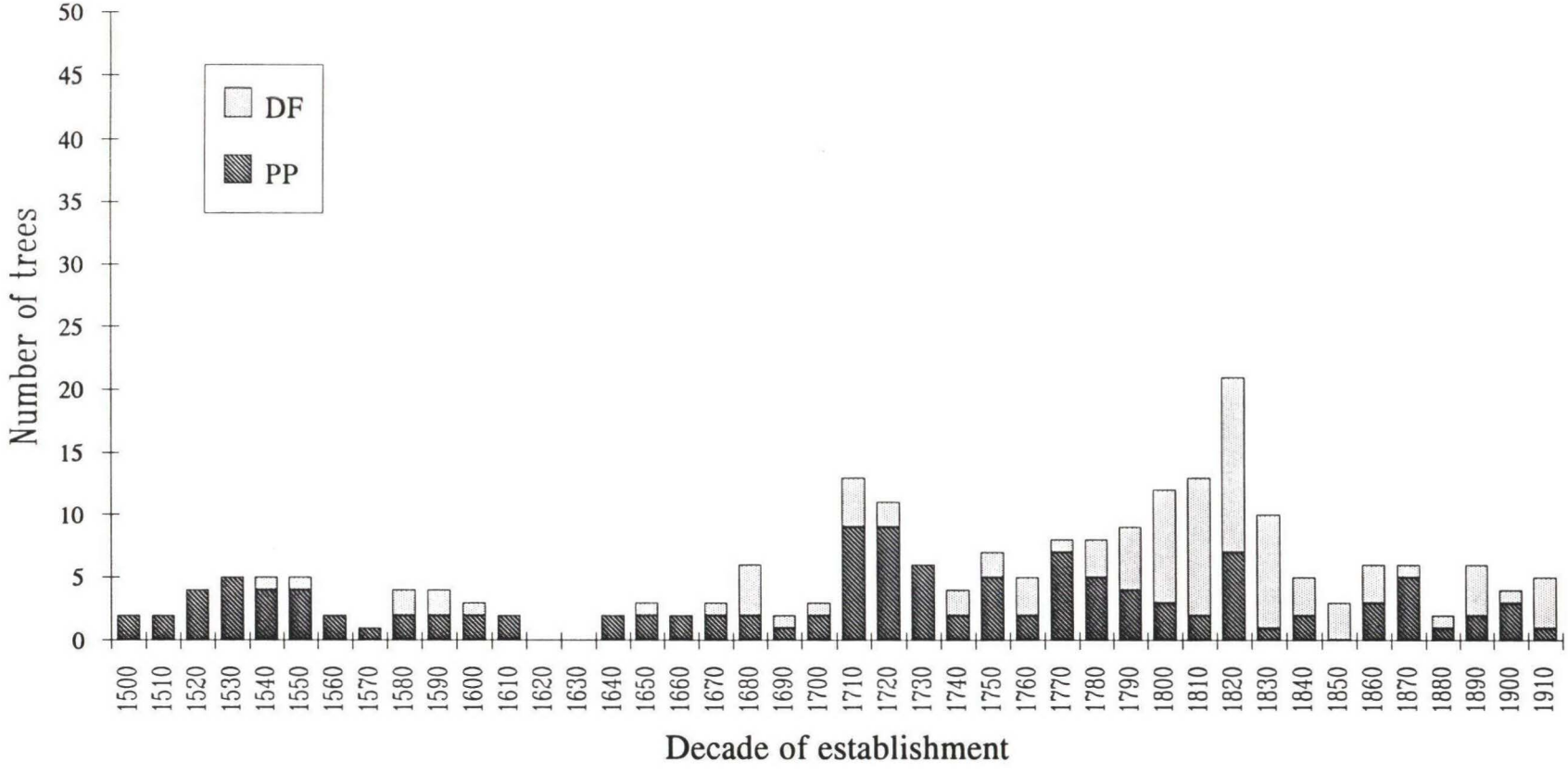

Figure 5: Plot 1, Sawmill Gulch, Lolo N.F.

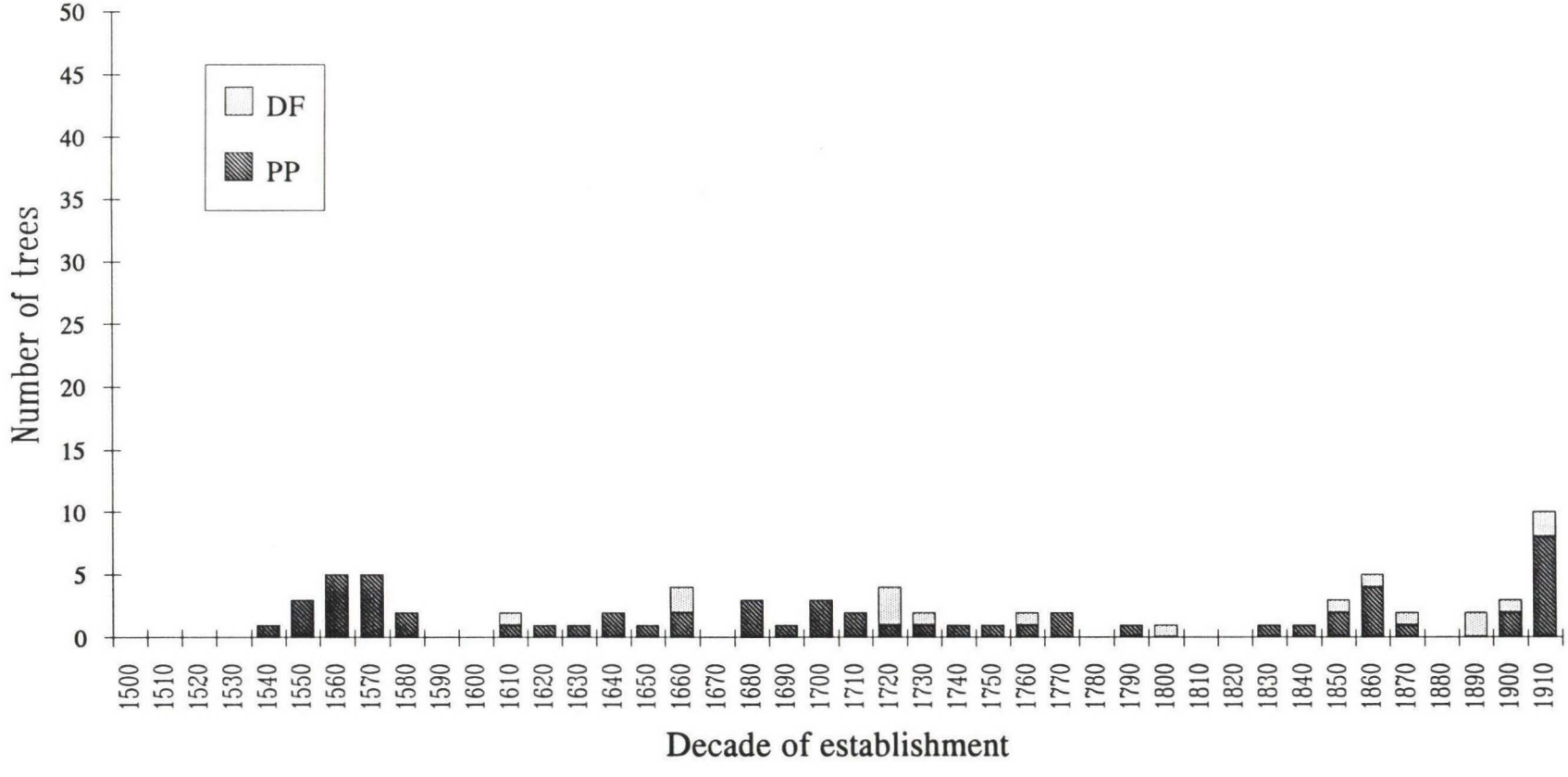

Figure 6: Plot 2, Sawmill Gulch, Lolo N.F.

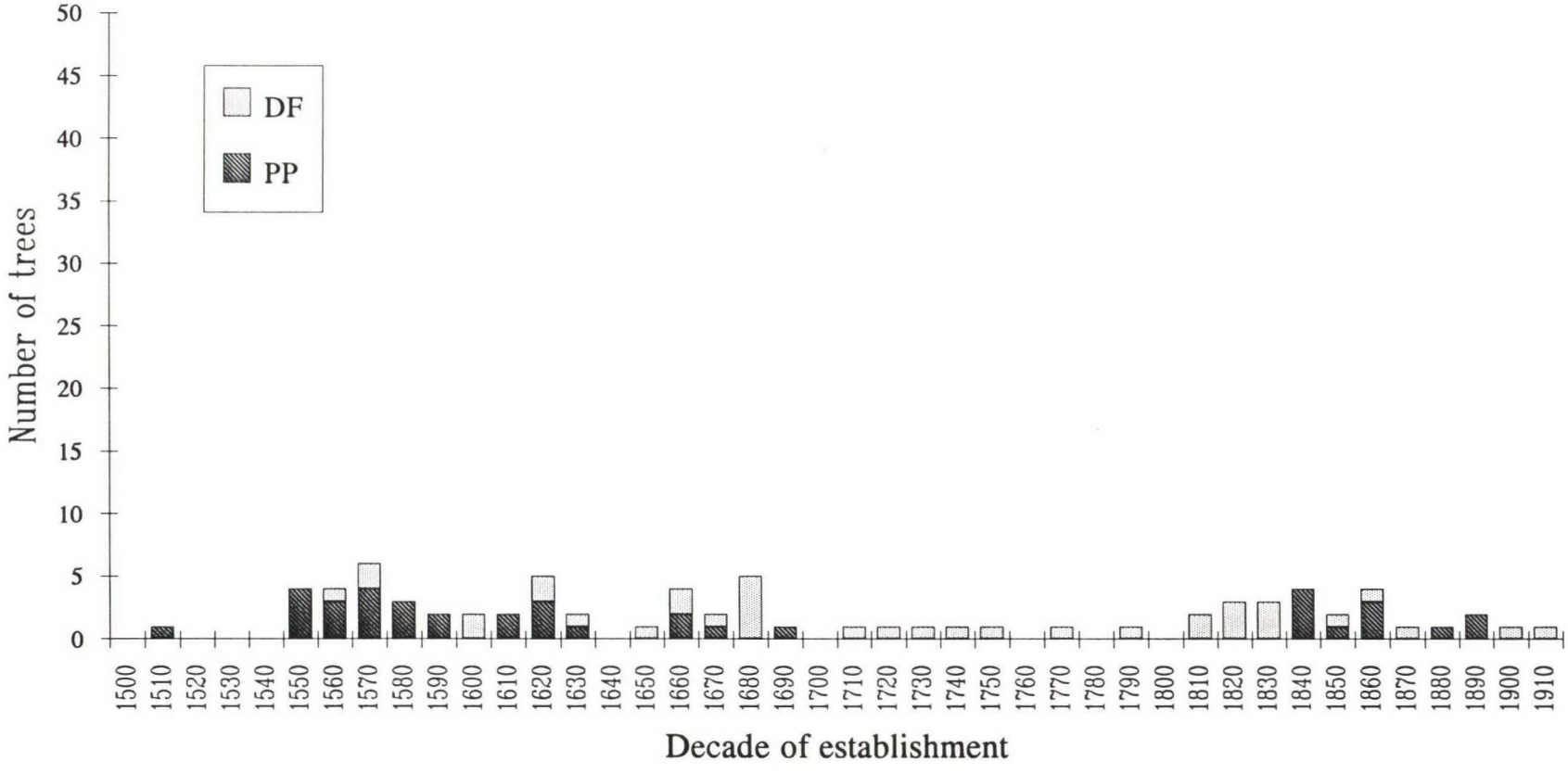

Figure 7: Plot 3, Sawmill Gulch, Lolo N. F.

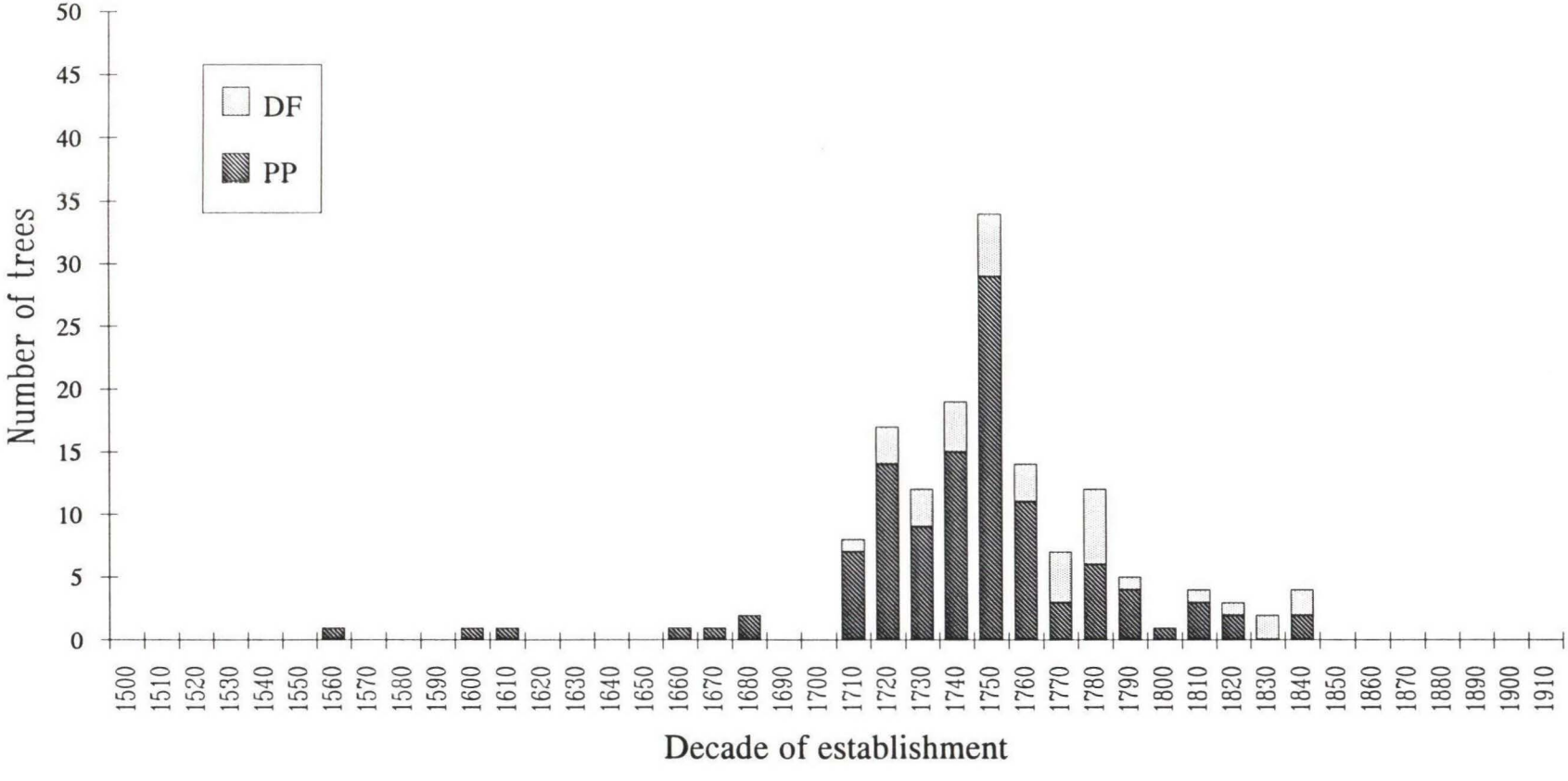

Figure 8: Sawmill Gulch, Lolo N. F.